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The long-term goal of this and other related work is to extend the technical capabilities of profiling floats, so that they can be used in an increasingly wide range of scientific applications. Profiling floats usually provide data at 7-10 day intervals. In many cases it is desirable to be able to track the float between profiles, so that oceanographic features can be followed in detail, or in order to keep track of the float in regimes when it cannot surface, such as under sea ice. Acoustic (ie, RAFOS) tracking is one way to make this possible.

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Low Frequency Acoustics and Profiling Floats

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LONG-TERM GOALS

The long-term goal of this and other related work is to extend the technical capabilities of profiling floats, so that they can be used in an increasingly wide range of scientific applications. Profiling floats usually provide data at 7-10 day intervals. In many cases it is desirable to be able to track the float between profiles, so that oceanographic features can be followed in detail, or in order to keep track of the float in regimes when it cannot surface, such as under sea ice. Acoustic (ie, RAFOS) tracking is one way to make this possible.

OBJECTIVES

The objective of this work is to add an acoustic tracking capability to one or two profiling floats and to deploy and test these floats in an existing acoustic source array. Additionally, it is hoped to be able to examine the software and firmware that are used in RAFOS tracking, essentially to explore parameters such as averaging interval, correlation function, and signal duration.

APPROACH

A new, C++ based controller for Webb/Apex floats has recently been designed by SeaBird Electronics in collaboration with UW and Webb Research Corp. The relative ease with which this controller can be programmed allows features such as RAFOS tracking to be added in a straightforward manner. In order to add RAFOS capability, we require the addition of (1) a hydrophone; (2) electronics capable of converting the analog signal from the hydrophone to a digital signal; (3) the ability for the controller to control the RAFOS electronics and to process and store the acoustical data.

WORK COMPLETED

We have designed a hydrophone mount that can be used for the externally mounted components on a profiling float, as shown in Figure 1. Presently the A/D converter is being constructed and the float controller is being programmed. It is estimated that this work will be completed and tested, and a working float will be ready to deploy, early in 2004.

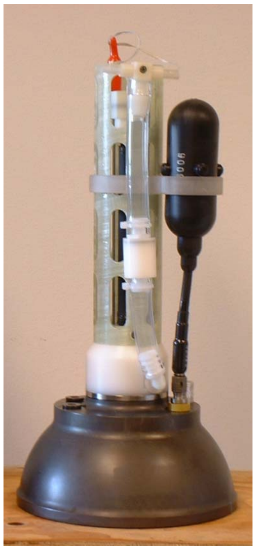

Figure 1. An Webb/Apex float head, showing a SeaBird CTD unit and a low-frequency hydrophone capable of receiving RAFOS transmissions.

RESULTS

It is expected that the first RAFOS/APEX float will be deployed for testing early in 2004 in an existing acoustic array. At the present time, we expect that the first float will be deployed in the Gulf of Mexico inside a source array maintained by Dr. K. Leaman of RSMAS. If this array cannot be used, we will deploy the float in Prof. T. Rossby's array in the N. Atlantic off Newfoundland. We hope to be able to track the float for 2-3 months and to collect daily positions in order to be able to assess the success of our design. Based on the results of this deployment, we will deploy a second float for a longer period. It is possible that investigators from Florida State University and IFM/Kiel will deploy a source array south of New Zealand sometime in 2004 for testing acoustic propagation in the Antarctic. If so, we will try to deploy the second float in this array.

IMPACT/APPLICATIONS

The results of this work will serve to increase the number of scientific applications where profiling floats can be used. The successful performance of the buoyancy engine on these floats, their relatively low cost, and their ease of deployment make them an attractive tool for many studies of ocean circulation. The addition of a RAFOS capability will increase the potential uses for these floats.